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312540  
p 39

# **28-Entity IGES Test File Results Using Computervision CADD5 4X**

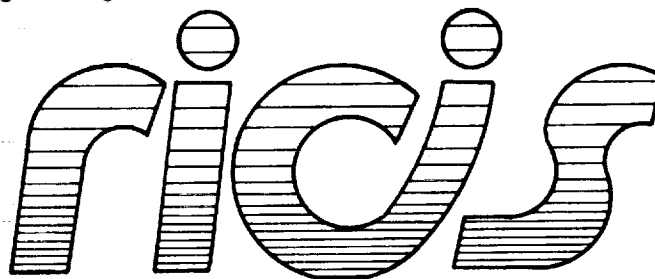
**Anchyi Kuan  
Saurin Shah  
Kevin Smith**

**University of Houston-Clear Lake**

**August 1987**

**Cooperative Agreement NCC 9-16  
Research Activity SE.8**

**NASA Johnson Space Center  
Engineering Directorate**



**Research Institute for Computing and Information Systems  
University of Houston - Clear Lake**

**T · E · C · H · N · I · C · A · L      R · E · P · O · R · T**

N91-13099

Unclas  
0312540

G3/61

(NASA-CR-187402) THE 28-ENTITY IGES TEST  
FILE RESULTS USING COMPUTERVISION CADD5 4X  
(Houston Univ.) 39 p  
CSCL 09B

## ***The RICIS Concept***

The University of Houston-Clear Lake established the Research Institute for Computing and Information systems in 1986 to encourage NASA Johnson Space Center and local industry to actively support research in the computing and information sciences. As part of this endeavor, UH-Clear Lake proposed a partnership with JSC to jointly define and manage an integrated program of research in advanced data processing technology needed for JSC's main missions, including administrative, engineering and science responsibilities. JSC agreed and entered into a three-year cooperative agreement with UH-Clear Lake beginning in May, 1986, to jointly plan and execute such research through RICIS. Additionally, under Cooperative Agreement NCC 9-16, computing and educational facilities are shared by the two institutions to conduct the research.

The mission of RICIS is to conduct, coordinate and disseminate research on computing and information systems among researchers, sponsors and users from UH-Clear Lake, NASA/JSC, and other research organizations. Within UH-Clear Lake, the mission is being implemented through interdisciplinary involvement of faculty and students from each of the four schools: Business, Education, Human Sciences and Humanities, and Natural and Applied Sciences.

Other research organizations are involved via the "gateway" concept. UH-Clear Lake establishes relationships with other universities and research organizations, having common research interests, to provide additional sources of expertise to conduct needed research.

A major role of RICIS is to find the best match of sponsors, researchers and research objectives to advance knowledge in the computing and information sciences. Working jointly with NASA/JSC, RICIS advises on research needs, recommends principals for conducting the research, provides technical and administrative support to coordinate the research, and integrates technical results into the cooperative goals of UH-Clear Lake and NASA/JSC.

***28-Entity IGES Test File Results Using  
Computervision CADD5 4X***

## **Preface**

This research was conducted under the auspices of the Research Institute for Computing and Information Systems by Anchi Kuan, Saurin Shah, and Kevin Smith. Rick Graves, of Barrios Technology, served as Principle Investigator and Sharon Perkins, Associate Professor of Computer Science, at the University of Houston-Clear Lake, served as the RICIS technical representative.

Funding has been provided by the Engineering Directorate, NASA/JSC through Cooperative Agreement NCC 9-16 between NASA Johnson Space Center and the University of Houston-Clear Lake. The NASA technical monitor for this activity was Dave Howes, Information Systems Manager, Engineering Directorate, NASA/JSC.

The views and conclusions contained in this report are those of the author and should not be interpreted as representative of the official policies, either express or implied, of NASA or the United States Government.

28-ENTITY IGES TEST FILE  
RESULTS USING COMPUTERVISION CADDS 4X

Prepared by :

Anchyl Kuan  
Saurin Shah  
Kevin Smith

In Support Of :

CTEC 5939  
CAD Systems Analysis  
Summer Semester 1987

With Supervision from :

Rick Graves  
Dr. Sharon Perkins

## TEST PROCEDURE

Our investigation was based on the following steps which were documented in an undated GSFC memorandum (a copy of this memorandum is provided as Attachment 1):

1. Read the 28 Entity IGES Test File into the CAD data base with the IGES post-processor.

2. Make the following modifications to the displayed geometries, which should produce the normalized front view shown in Figure 4 and the drawing entity defined display shown in Figure 5.

- a) Translate the linear string (106) -2.99 in the X, -26.25 in the Y, and 26.5 in the Z directions.
- b) Scale the line entities (110) about their midpoints by a factor of 1.5.
- c) Translate the Circular Arc (100) 14.5 in the X, -32.74 in the Y, and 35.25 in the Z directions.
- d) Scale the translated circular arc about its center by a factor of 1.67.

3. Produce the drawing entity defined display of the file as it appears in the CAD system after modification to the geometry.

4. Translate the file back to IGES format using the IGES pre-processor.

5. Read the IGES file produced by the pre-processor back into the CAD data base.

6. Produce another drawing entity defined display of the CAD display.

7. Compare the plots resulting from steps 3 and 6. These plots should look like Figure 5 and be identical to each other.

### I. System Configuration Used At Houston ATC For IGES test

#### \* Hardware

- Host Computer : Computervision 4001  
3 MB Memory
- (3) Disk Drives of model:  
41322 300 MB removable
- (1) Magnetic Tape Drive Model 41331
- (6) Instaview Workstations with C size tablets
- Versatec 7200 Electrostatic plotter
- 300 CPS Line Printer

#### \* Software

- Operating system : CGOS 200X version 4.1

Linear dimension	216	Linear dimension
Ordinate dimension	218	Ordinate dimension
Point dimension	220	Ordinate dimension
Radius dimension	222	Radius dimension
Subfigure definition	308	Subfigure part file
Drawing	404	Drawing
Singular subfigure instance	408	Subfigure instance
View	410	View

III. The 28 entity IGES test file was post-processed directly from tape to the CV CADDs database. The Tabulated Cylinder and Plane entities were the only entities which were not recovered successfully. The 28 entity part file stored in the CV CADDs database was then pre-processed. The resulting IGES part file is listed in Attachment 2.

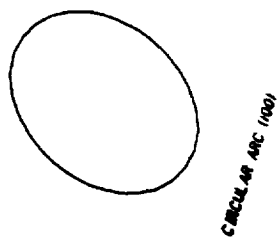
#### IV. Figure Index

- Figure 1 presents the 28 entity test file as it was created by GSFC's NASCAD.
- Figure 1A presents the 28 entity test file as it was recovered on the CV CADDs.
- Figure 2 presents a rotated view of the 28 entity NASCAD test file.
- Figure 2A presents CV's corresponding rotated view of the 28 entity test file.
- Figure 3 presents a NASCAD unmodified drawing defined display.
- Figure 3A presents CV's corresponding unmodified drawing defined display.
- Figure 4 presents a NASCAD display of the IGES test file after modification.
- Figure 4A presents CV's corresponding display of the IGES test file after modification.
- Figure 5 presents the NASCAD modified drawing defined

**FIGURES**



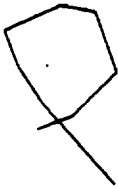
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OF POOR QUALITY



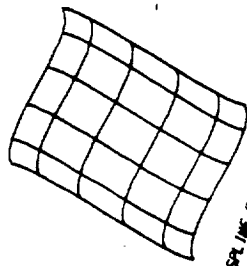
CIRCULAR ARC (100)



COMPOSITE CURVE (102)

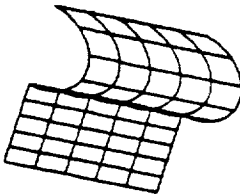


CONE ARC (104)

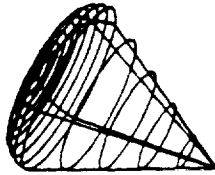


SPLINE (112)

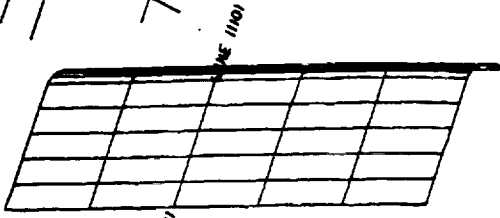
LINEAR STRIP (105)



RULED SURFACE (118)



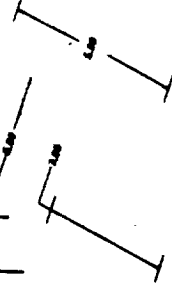
CON. OF REV. (120)



PLANE (108)

TABULATED CYLINDER (121)

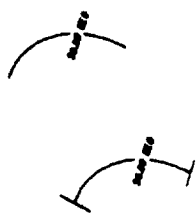
TEXT 1  
TEXT 2



GENERAL NOTE (123)

SUBFIGURE  
(408)

LINEAR DIMENSION (1216)



ANGULAR DIMENSION (1207)

DIAMETER DIMENSION (1206)

FLAT NOTE (1208)



POINT (116)

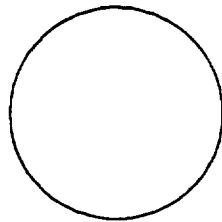


POINT DIMENSION (1220)

ORDINATE DIMENSION (1219)

RADIUS DIMENSION (1221)

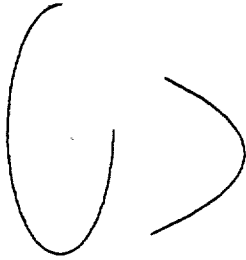
FIGURE 1-A



CIRCULAR ARC (100)



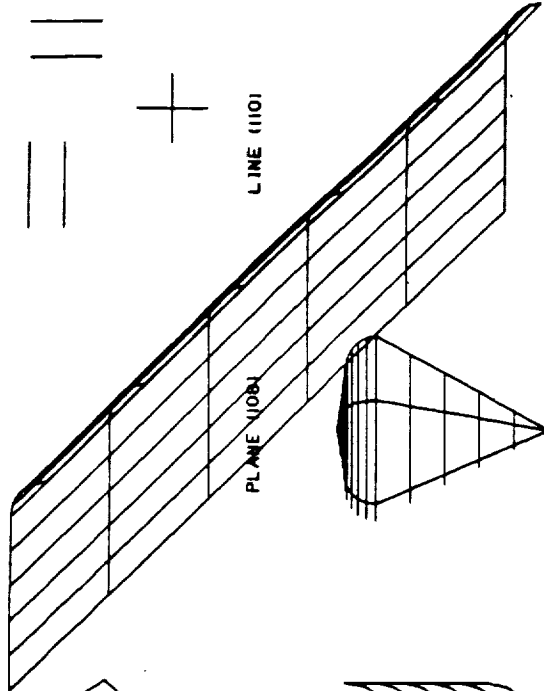
COMPOSITE CURVE (102)



CONIC ARC (104)



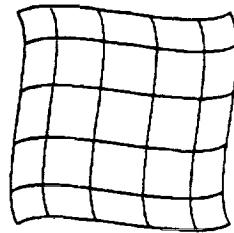
LINEAR STRING (106)



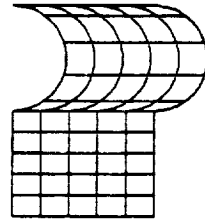
PLANE (110)



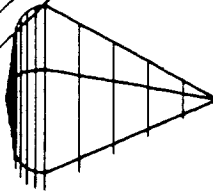
SPLINE (112)



SPLINE SURFACE (114)

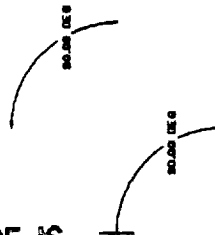


RULED SURFACE (118)

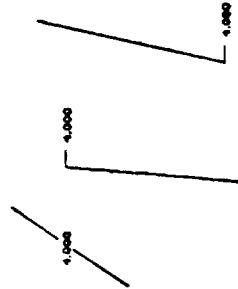


SURF. OF REV. (120)

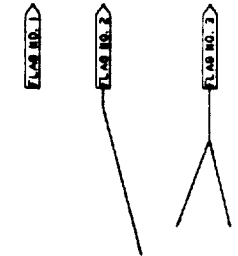
TABULATED CYLINDER (122)



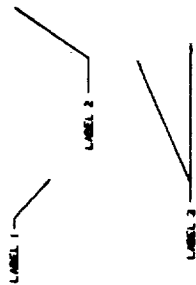
ANGULAR DIMENSION (201)



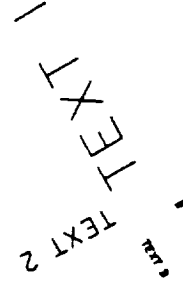
DIAMETER DIMENSION (206)



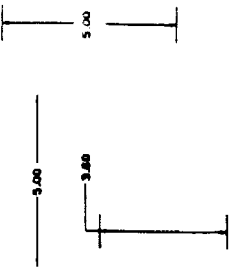
FLAG NOTE (208)



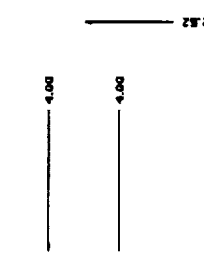
GENERAL LABEL (210)



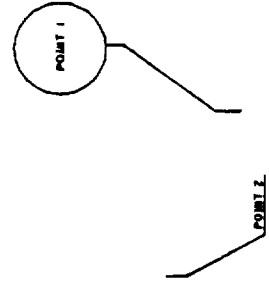
GENERAL NOTE (212)



LINEAR DIMENSION (216)



ORDINATE DIMENSION (218)



POINT DIMENSION (220)



RADIUS DIMENSION (222)

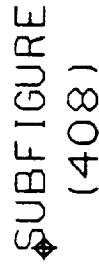


FIGURE 2-A

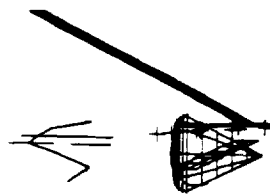
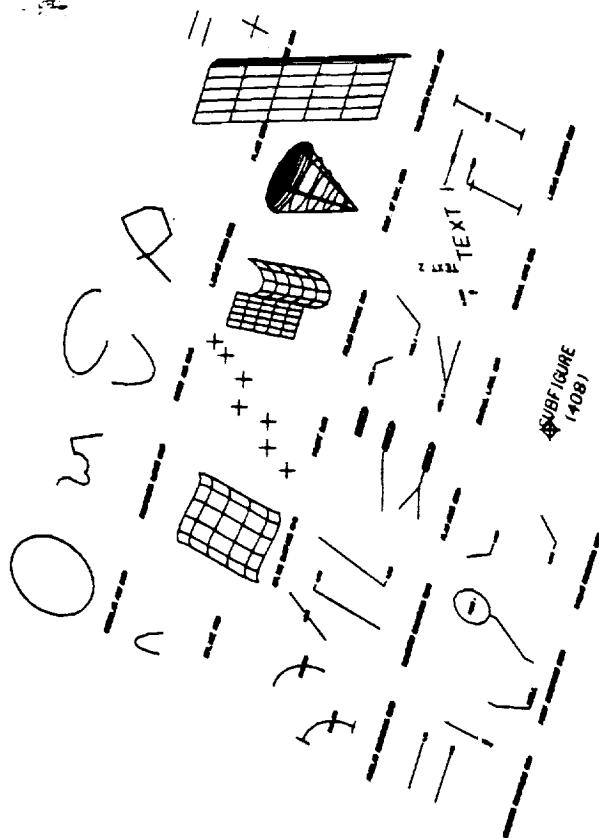
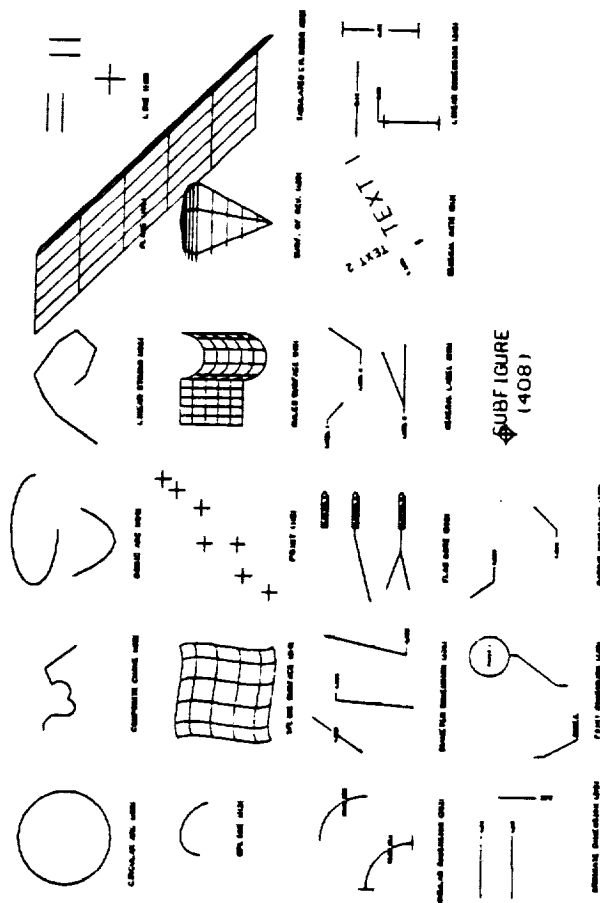
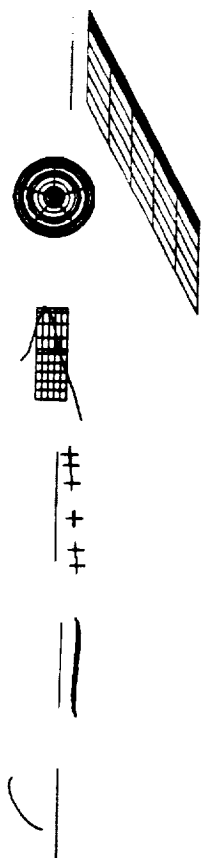
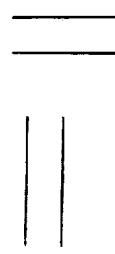


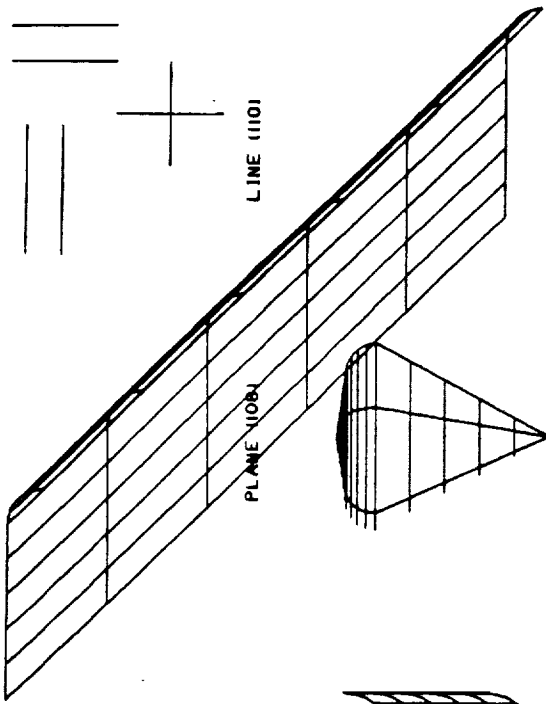
FIGURE 3-A



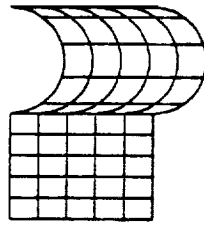
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OF POOR QUALITY



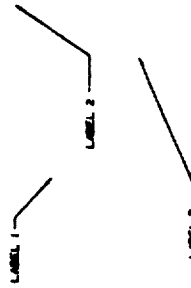
LINE (110)



RULED SURFACE (118)

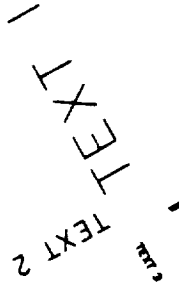


RULED SURFACE (118)



SURF. OF REV. (120)

TABULATED CYLINDER (122)



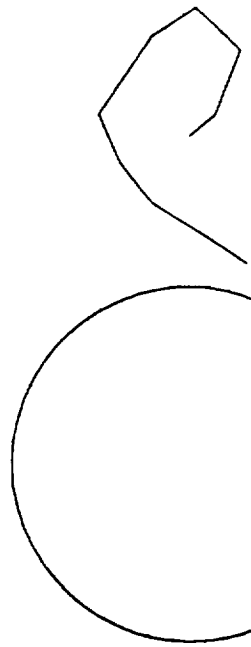
GENERAL NOTE (212)

GENERAL LABEL (210)

FLAG NOTE (208)

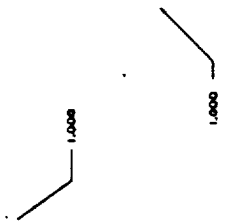
DIAMETER DIMENSION (206)

ANGULAR DIMENSION (202)

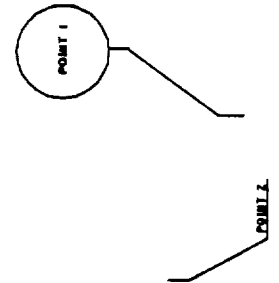


LINEAR DIMENSION (216)

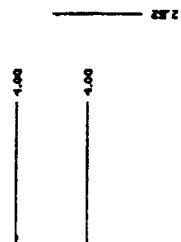
SUBFIGURE (408)



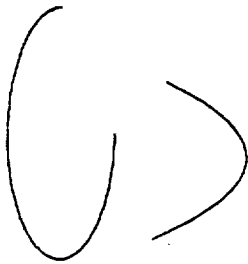
RADIUS DIMENSION (222)



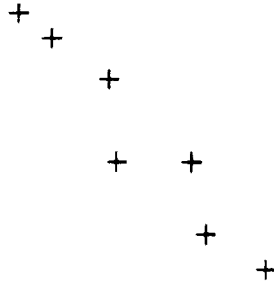
POINT DIMENSION (220)



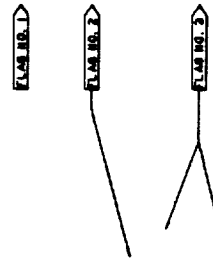
ORDINATE DIMENSION (218)



CONIC ARC (104)



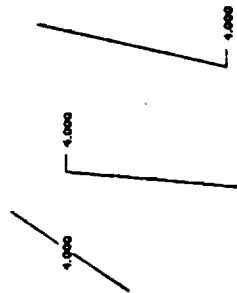
POINT (116)



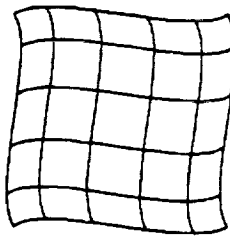
FLAG NB. 1

FLAG NB. 2

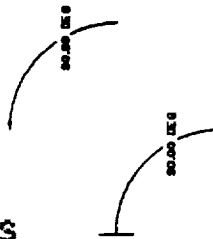
FLAG NB. 3



SPLINE SURFACE (114)



SPLINE (112)

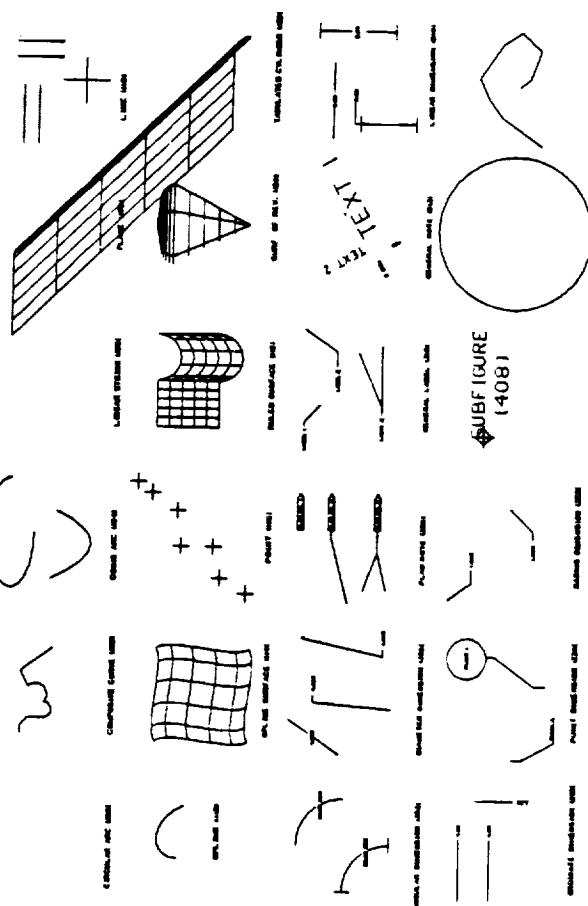
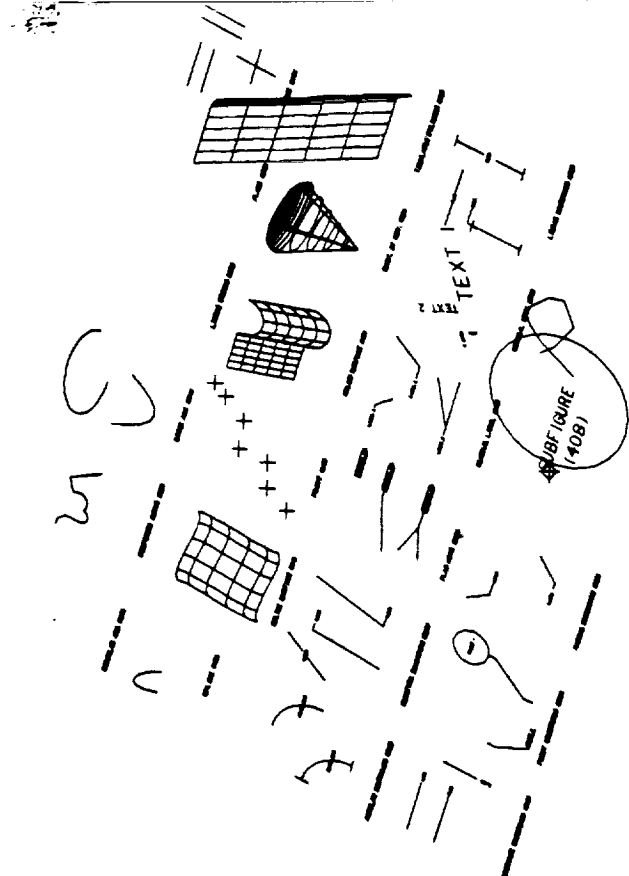


CIRCULAR ARC (100)

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FIGURE 4-A

FIGURE 5-A



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V. For the entities that CV CADDs supports, they are represented as follows :

\* In the actual CADDs database, each entity has a Part Master Index (PMI) record. This record consists of 8 words. These words consist of 16 bits and are broken down as follows :

- Entity type and layer
- Status
  - Get attention status
  - highlight attention status
  - blanking status
  - deletable status
  - relation status
  - application status
  - other status
  - solid status
  - # of groups entities belong to
- Part data file pointer (PDF pointer)
- Part data file pointer (PDF pointer)
- Pointer to tab and matrix
- Model, drawing or detail entity ; and what drawing the entity belongs to
- Tag name (Master Index Pointer (MIPTR))
- Tag name (MIPTR)

\* In neutral IGES format, each entity is represented in the IGES file by two records of ten fields each in the Directory Entry (DE) section and a number of corresponding records in the Parameter Data (PD) section. The fields of the parameter data record vary from entity to entity. The DE records for each entity consist of the following fields :

- Entity type,
- P.D. pointer,
- IGES version number,
- Line font pattern number,
- Level number,
- View pointer,
- Defining Matrix pointer,
- Label display associativity pointer,
- Status number,
- Sequence number,
- Entity number,
- Line weight number,
- Pen number,
- PD record count number,
- Form number,
- Reserved,
- Reserved,
- Entity label,
- Entity subscript number,
- Sequence number.

National Aeronautics and  
Space Administration



Goddard Space Flight Center  
Greenbelt, Maryland  
20771

Reply to Attn of 753

TO: Distribution

FROM: Engineering Directorate  
Engineering Services Division

SUBJECT: Twenty-Eight (28) Entity Test File and Documentation

Enclosed is a magnetic tape containing the verified 28 entity test file and a copy of the documentation that will be sent with the tape down to COSMIC, the NASA software distribution center. Organizations desiring copies of this documentation and the test tape should obtain them through COSMIC located at the University of Georgia, 112 Barrow Hall, Athens, Georgia 30602, telephone 404-542-3265. There is a nominal fee for organizations not working on NASA projects to obtain the tape and documentation.

In order to use the 28 entity file in another round of testing, follow the procedures outlined in the Test Methodology Section of the enclosed documentation. These are essentially the same testing procedures used in the last round of IGES testing, however, this time we are requesting that you read in and plot the IGES file produced by your CAD system preprocessor to provide further test data.

Please return, both on magnetic tape and electronically, the IGES file produced by your preprocessor. To transfer the file electronically, contact me for the phone number and account to use. Along with the magnetic tape, you should include hardcopy plots of how both the original 28 entity test file and the file produced by your preprocessor display on your CAD system as well as a written description of the steps used to process the file and any problems encountered in processing. The results of the testing should be returned to GSFC no later than May 13, 1985, and please bring whatever results are available to the next OCE meeting.

If you have any questions or problems please call me on FTS 344-1254.

Scott Gordon  
Engineering Design Branch

Enclosures: 2

## DOCUMENTATION FOR NASA 28 ENTITY IGES TEST TAPE

This documentation covers the accompanying magnetic tape which contains a test file of Computer Aided Design (CAD) data formatted according to the National Bureau of Standards (NBS) Initial Graphic Exchange Specification (IGES). This file was created for the purpose of conducting a NASA test, sponsored by the NASA Office of Chief Engineer, to determine to what extent dissimilar CAD systems used by NASA could exchange data using the IGES standard formats and IGES translators.

The tape file contains 28 different IGES entities, which were chosen because they define the geometric, annotation, and display formatting information that currently appears to be most important for CAD information transfer on NASA projects. Further information on the IGES format and entities can be found in the NBS IGES Version 2.0 Report, NBSIR 82-2631 (AF).

The test file, which contains sequentially organized, fixed length records containing ASCII characters, was created manually using a text editor. Aside from visual checking against the NBS documents defining IGES, the contents of this file have also been verified by the IGES Data Analysis Company (IDA) for conformance with the IGES Version 2.0 standard. A copy of the IDA verification report (Enclosure 1) is included with this document. The graphics displays shown in the figures were generated from this test file using the NASA Computer Aided Design (NASCAD) program, which contains logic to graphically display IGES files. The NASCAD program and the IGES test data are available through COSMIC located at the University of Georgia, 112 Barrow Hall, Athens, Georgia 30602, telephone 404-542-3265.

### Test File Description

The NASA IGES Test File contains examples of the following entities.

<u>ENTITY NAME</u>	<u>ENTITY TYPE NUMBER</u>
1. Circular Arc	(100)
2. Composite Curve	(102)
3. Conic Arc	(104)
4. Copious Data	(106)
5. Plane	(108)
6. Line	(110)
7. Parametric Spline Curve	(112)
8. Parametric Spline Surface	(114)
9. Point	(116)
10. Ruled Surface	(118)
11. Surface of Revolution	(120)
12. Tabulated Cylindere	(122)
13. Transformation Matrix	(124)
14. Angular Dimension	(202)
15. Diameter Dimension	(206)
16. Flag Note	(208)
17. General Label	(210)
18. General Note	(212)
19. Leader (Arrow)	(214)
20. Linear Dimension	(216)
21. Ordinate Dimension	(218)
22. Point Dimension	(220)
23. Radius Dimension	(222)



d) Scale the translated Circular Arc about its center by a factor of 1.67.

3. Produce the drawing entity defined display of the file as it appears in the CAD system after modification to the geometry.
4. Translate the file back to IGES format using IGES pre-processor.
5. Read IGES file produced by pre-processor back into CAD data base.
6. Produce another drawing entity defined display of the CAD display.
7. Compare the plots resulting from steps 3 and 6. These plots should look like Figure 5 and be identical to each other.

Because of the complexity of the view and drawing information in IGES, many CAD systems do not support or cannot properly process these entities. In the event that the drawing defined by the Drawing Entity cannot be displayed, intermediate test results can be obtained by performing the above steps, using plots of a normalized front view display instead of the drawing entity defined display. The plots can be compared against figure 4 to check results of the processing.

#### File Characteristics

The NASA 28 Entity IGES Test File has been placed on a magnetic tape with the following characteristics:

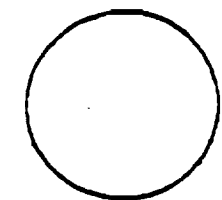
1. 9-Track Tape, 1600 BPI
2. Unlabeled
3. One (1) File on tape
4. All ASCII Characters
5. 80 Characters per Record
6. Ten (10) Records per Block (Blocksize of 800 bytes)

As an aid to insure the correctness of the tape file, Enclosure 2 is a complete listing of the contents of the 28 Entity IGES test file on the tape. In order to check for errors, the following FORTRAN program for a DEC VAX computer with the DEC VMS operating system can be used to perform a checksum calculation, the value of which for this test file is 2153650.

```

C
C THIS FORTRAN PROGRAM COMPUTES A CHECKSUM FOR FILES WITH 80
C CHARACTER RECORDS
C
      CHARACTER*80 C
      ISUM=0
      DOWHILE(.TRUE.)
        READ(5, '(A80)'), END=100)C
        DO I=1,80
          ISUM=ISUM+ICHAR(C(I:I))
        ENDDO
      ENDDO
100  WRITE(6,*) ' CHECKSUM = ', ISUM
      END

```



CIRCULAR ARC (1100)



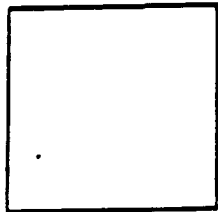
COMPOSITE CURVE (1101)



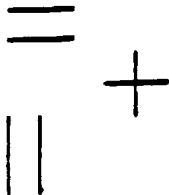
CONIC ARC (1102)



LINEAR STRING (1103)



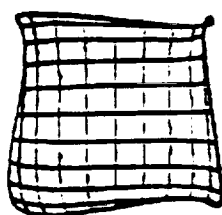
PLANE (1104)



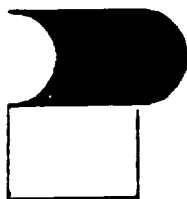
LINE (1105)



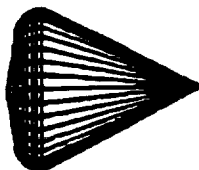
PLANE (1106)



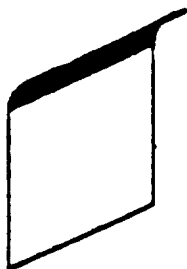
SURFACE (1107)



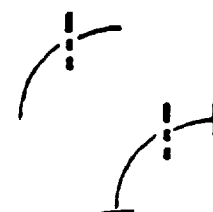
BLENDED SURFACE (1108)



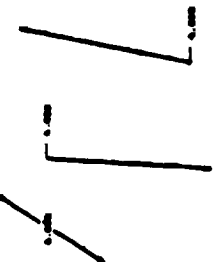
BLF. OF REV. (1109)



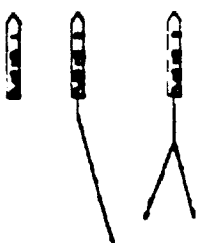
TRANSLATED CYLINDER (1110)



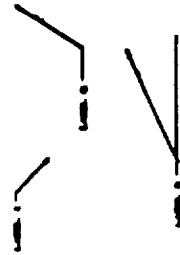
ANGULAR DIMENSION (1201)



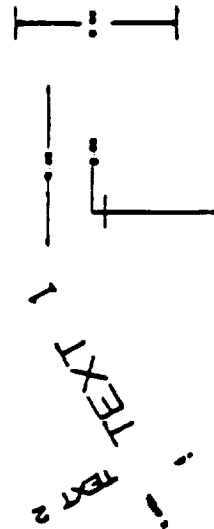
BIVARIATE DIMENSION (1202)



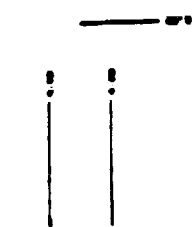
FLAG NOTE (1203)



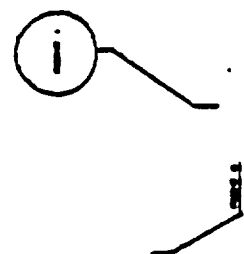
INTERNAL LABEL (1204)



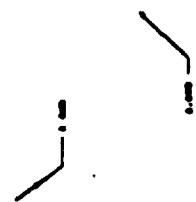
EXTERNAL NOTE (1205)



OGIVE DIMENSION (1206)



POINT DIMENSION (1207)

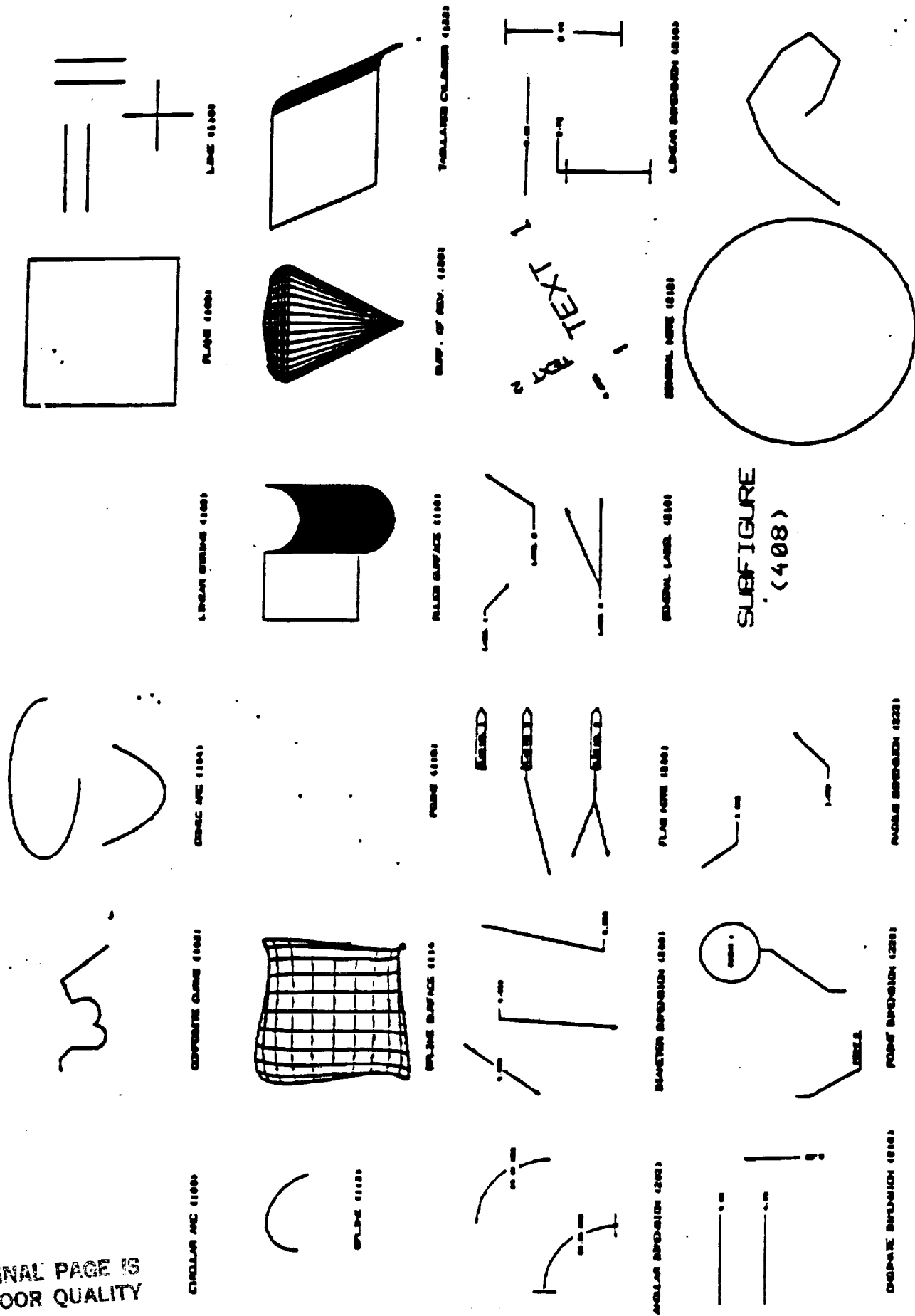


RADIUS DIMENSION (1208)

SUBFIGURE  
(408)

ORIGINAL PAGE IS  
OF POOR QUALITY

ORIGINAL PAGE IS  
OF POOR QUALITY



Modified File  
Rotated View

NASCAD Display of IGES Test File after Modification  
Figure 4

# 28 Entity IGES File Listing

IGES TEST CASE										S	1
THIS FILE CONTAINS AN EXAMPLE OF THE DRAWING ENTITY										S	2
15...14HICES TEST FILE.6HIVASCAD..32.8.36.8.36.6HFILE 3.1.00.1.										C	1
4HINCH.1.0.10.13H840716.163000.1.00E-05.100.00.9HS. CORDON.4HCSFC;										C	2
124	1	1	1	0	0	0	0	000000000D		1	
124	0	0	2	0	0	0	0	TRIRX ID		2	
100	3	1	1	0	343	1	0	000000000D		3	
100	0	0	1	0	0	0	0	ARC D		4	
212	4	1	1	0	341	1	0	000000100D		5	
212	0	0	2	0	0	0	0	NOTE D		6	
102	6	1	1	0	0	1	0	000000000D		7	
102	0	0	1	0	0	0	0	CURVE D		8	
110	7	1	1	0	0	0	0	000010000D		9	
110	0	0	1	0	0	0	0	LINE D		10	
110	8	1	1	0	0	0	0	000010000D		11	
110	0	0	1	0	0	0	0	LINE D		12	
110	9	1	1	0	0	0	0	000010000D		13	
110	0	0	1	0	0	0	0	LINE D		14	
100	10	1	1	0	0	0	0	000010000D		15	
100	0	0	1	0	0	0	0	ARC D		16	
100	11	1	1	0	0	0	0	000010000D		17	
100	0	0	1	0	0	0	0	ARC D		18	
110	12	1	1	0	0	0	0	000010000D		19	
110	0	0	1	0	0	0	0	LINE D		20	
110	13	1	1	0	0	0	0	000010000D		21	
110	0	0	1	0	0	0	0	LINE D		22	
212	14	1	1	0	341	1	0	000000100D		23	
212	0	0	2	0	0	0	0	NOTE D		24	
110	16	1	1	0	0	1	0	000000000D		25	
110	0	0	1	0	0	0	0	LINE D		26	
110	17	1	1	0	0	1	0	000000000D		27	
110	0	0	1	0	0	0	0	LINE D		28	
110	18	1	1	0	0	1	0	000000000D		29	
110	0	0	1	0	0	0	0	LINE D		30	
110	19	1	1	0	0	1	0	000000000D		31	
110	0	0	1	0	0	0	0	LINE D		32	
110	20	1	1	0	0	1	0	000000000D		33	
110	0	0	1	0	0	0	0	LINE D		34	
110	21	1	1	0	0	1	0	000000000D		35	
110	0	0	1	0	0	0	0	LINE D		36	
212	22	1	1	0	341	1	0	000000100D		37	
212	0	0	2	0	0	0	0	NOTE D		38	
112	24	1	1	0	0	1	0	000000000D		39	
112	0	0	35	0	0	0	0	SPLINE D		40	
212	39	1	1	0	341	1	0	000000100D		41	
212	0	0	2	0	0	0	0	NOTE D		42	
118	61	1	1	0	0	1	0	000000000D		43	
118	0	0	1	0	0	0	0	RSURF D		44	
102	62	1	1	0	0	0	0	000010000D		45	
102	0	0	1	0	0	0	0	CURVE D		46	
110	63	0	1	0	0	0	0	000010000D		47	
110	0	0	1	0	0	0	0	LINE D		48	
100	64	1	1	0	0	0	0	000010000D		49	
100	0	0	1	0	0	0	0	ARC D		50	
102	65	1	1	0	0	0	0	000010000D		51	
102	0	1	1	0	0	0	0	CURVE D		52	
110	66	1	1	0	0	0	0	000010000D		53	
110	0	0	1	0	0	0	0	LINE D		54	
100	67	1	1	0	0	0	0	000010000D		55	
100	0	0	1	0	0	0	0	ARC D		56	
212	68	1	1	0	341	1	0	000000100D		57	

214	112	1	1	0	0	0	000010100D	119	
214	0	0	1	3	0	0	LEADER	D	120
206	113	1	1	0	341	1	000000100D	121	
206	0	0	1	0	0	0	DDIM	D	122
212	114	1	1	0	0	0	000010100D	123	
212	0	0	2	0	0	0	NOTE	D	124
214	116	1	1	0	0	0	000010100D	125	
214	0	0	1	3	0	0	LEADER	D	126
214	117	1	1	0	0	0	000010100D	127	
214	0	0	2	3	0	0	LEADER	D	128
206	119	1	1	0	341	1	000000100D	129	
206	0	0	1	0	0	0	DDIM	D	130
212	120	1	1	0	0	0	000010100D	131	
212	0	0	2	0	0	0	NOTE	D	132
214	122	1	1	0	0	0	000010100D	133	
214	0	0	1	3	0	0	LEADER	D	134
214	123	1	1	0	0	0	000010100D	135	
214	0	0	2	3	0	0	LEADER	D	136
212	125	1	1	0	341	1	000000100D	137	
212	0	0	2	0	0	0	NOTE	D	138
104	127	1	1	0	0	1	000000000D	139	
104	0	0	2	1	0	1	CONIC	D	140
104	129	1	1	0	0	1	000000000D	141	
104	0	0	2	3	0	0	CONIC	D	142
212	131	1	1	0	341	1	000000100D	143	
212	0	0	2	0	0	0	NOTE	D	144
106	133	1	1	0	0	1	000000000D	145	
106	0	0	3	12	0	0	STRING	D	146
212	136	1	1	0	341	1	000000100D	147	
212	0	0	2	0	0	0	NOTE	D	148
108	138	1	1	0	0	1	000000000D	149	
108	0	0	1	1	0	0	PLANE	D	150
102	139	1	1	0	0	0	000010000D	151	
102	0	0	1	0	0	0	CURVE	D	152
110	140	1	1	0	0	0	000010000D	153	
110	0	0	1	0	0	0	LINE	D	154
110	141	1	1	0	0	0	000010000D	155	
110	0	0	1	0	0	0	LINE	D	156
110	142	1	1	0	0	0	000010000D	157	
110	0	0	1	0	0	0	LINE	D	158
110	143	1	1	0	0	0	000010000D	159	
110	0	0	1	0	0	0	LINE	D	160
212	144	1	1	0	341	1	000000100D	161	
212	0	0	2	0	0	0	NOTE	D	162
116	146	1	1	0	0	1	000000000D	163	
116	0	0	1	0	0	1	POINT	D	164
116	147	1	1	0	0	1	000000000D	165	
116	0	0	1	0	0	1	POINT	D	166
116	148	1	1	0	0	1	000000000D	167	
116	0	0	1	0	0	1	POINT	D	168
116	149	1	1	0	0	1	000000000D	169	
116	0	0	1	0	0	1	POINT	D	170
116	150	1	1	0	0	1	000000000D	171	
116	0	0	1	0	0	1	POINT	D	172
116	151	1	1	0	0	1	000000000D	173	
116	0	0	1	0	0	1	POINT	D	174
116	152	1	1	0	0	1	000000000D	175	
116	0	0	1	0	0	1	POINT	D	176
212	153	1	1	0	341	1	000000100D	177	
212	0	0	2	0	0	0	NOTE	D	178
210	155	1	1	0	341	1	000000100D	179	

220	198	1	1	0	341	1	000000100D	241
220	0	0	1	0			PNTDIM D	242
212	199	1	1	0	0	0	000010100D	243
212	0	0	2	0			NOTE D	244
214	201	1	1	0	0	0	000010100D	245
214	0	0	2	4			LEADER D	246
100	203	1	1	0	0	0	000010000D	247
100	0	0	1	0			ARC D	248
220	204	1	1	0	341	1	000000100D	249
220	0	0	1	0			PNTDIM D	250
212	205	1	1	0	0	0	000010100D	251
212	0	0	2	0			NOTE D	252
214	207	1	1	0	0	0	000010100D	253
214	0	0	2	4			LEADER D	254
212	209	1	1	0	341	1	000000100D	255
212	0	0	2	0			NOTE D	256
222	211	1	1	0	341	1	000000100D	257
222	0	0	1	0			RADDIM D	258
212	212	1	1	0	0	0	000010100D	259
212	0	0	2	0			NOTE D	260
214	214	1	1	0	0	0	000010100D	261
214	0	0	2	3			LEADER D	262
222	216	1	1	0	341	1	000000100D	263
222	0	0	1	0			RADDIM D	264
212	217	1	1	0	0	0	000010100D	265
212	0	0	2	0			NOTE D	266
214	219	1	1	0	0	0	000010100D	267
214	0	0	1	3			LEADER D	268
212	220	1	1	0	341	1	000000100D	269
212	0	0	2	0			NOTE D	270
122	222	1	1	0	0	1	000000000D	271
122	0	0	1	0			TABCYL D	272
102	223	1	1	0	0	0	000010000D	273
102	0	0	1	0			CURVE D	274
100	224	1	1	0	0	0	000010000D	275
100	0	0	1	0			ARC D	276
110	225	1	1	0	0	0	000010000D	277
110	0	0	1	0			LINE D	278
212	226	1	1	0	341	1	000000100D	279
212	0	0	2	0			NOTE D	280
308	228	1	1	0	0	0	000000200D	281
308	0	0	1	0			F G V F D	282
212	229	1	1	0	0	0	000030100D	283
212	0	0	2	0			NOTE D	284
408	231	1	1	0	341	1	000000100D	285
408	0	0	1	0			SUBFIG : D	286
202	232	1	1	0	341	1	000000100D	287
202	0	0	1	0			ANGDIM D	288
212	233	1	1	0	0	0	000010100D	289
212	0	0	2	0			NOTE D	290
214	235	1	1	0	0	0	000010100D	291
214	0	0	1	3			LEADER D	292
214	236	1	1	0	0	0	000010100D	293
214	0	0	1	3			LEADER D	294
202	237	1	1	0	341	1	000000100D	295
202	0	0	1	0			ANGDIM D	296
212	238	1	1	0	0	0	000010100D	297
212	0	0	2	0			NOTE D	298
106	240	1	1	0	0	0	000010100D	299
106	0	0	1	40			WITNESS D	300
106	241	1	1	0	0	0	000010100D	301

110.21.00.26.00.1.00.23.50.26.00.1.00.0.0;	27P	17
110.26.00.27.00.1.00.26.00.25.00.1.00.0.0;	29P	18
110.27.00.27.00.1.00.27.00.25.00.1.00.0.0;	31P	19
110.24.50.24.00.1.00.24.50.22.00.1.00.0.0;	33P	20
110.23.50.23.00.1.00.23.50.23.00.1.00.0.0;	35P	21
212.1.10.3.00.0.30.1.1.5707963.0.0.0.0.22.00.20.50.	37P	22
0.0.10ELINE (110).0.0;	37P	23
112.3.0.3.15.0.0.0.2719053.0.6714051.0.9433063.1.3425058.	39P	24
1.7423051.2.0142004.2.4137074.2.8132071.3.2127040.	39P	25
3.6122057.4.0117048.4.4112046.4.8107045.5.2102045.5.6097035.	39P	26
-26.0161954.0.0345794.0.0.0.3244740.16.1824389.0.8564018.	39P	27
0.0.-0.1267781.1.9159014.0.5176959.0.0.0.1431206.-26.0001809.	39P	28
0.1068459.0.2646767.-0.0627361.16.4127488.0.8282831.-0.1034142.	39P	29
-0.0215049.2.0595417.0.5494392.0.1167449.-0.0542858.-25.9192617.	39P	30
0.2882843.0.1894875.0.0103111.16.7287662.0.7353175.-0.1292908.	39P	31
-0.0301380.2.2942138.0.6167263.0.0516833.-0.0108403.-25.8264599.	39P	32
0.3936158.0.1978983.-0.0232532.16.9155369.0.6583239.-0.1538747.	39P	33
-0.0261188.2.4655128.0.6424942.0.0430856.-0.0308710.-25.6393087.	39P	34
0.5406028.0.1700295.-0.0264296.17.1523132.0.5228725.-0.1851781.	39P	35
-0.0188928.2.7271161.0.6622822.0.0064463.-0.0288346.-25.3978868.	39P	36
0.6638016.0.1363537.-0.0250792.17.3304415.0.3658696.-0.2078211.	39P	37
-0.0109925.2.990907.0.6837694.-0.0277548.-0.0230826.-25.2076724.	39P	38
0.7334768.0.1178964.-0.0342911.17.4143372.0.2504171.-0.2167878.	39P	39
-0.0080331.3.1661534.0.6335632.-0.0468559.-0.0275076.-24.8980193.	39P	40
0.8112573.0.0767986.-0.0346088.17.4792671.0.0733578.-0.2264158.	39P	41
0.0010430.3.4100766.0.5831921.-0.0795268.-0.0224660.-24.5638719.	39P	42
0.8560486.0.0353200.-0.0363817.17.4725041.-0.1070486.-0.2251654.	39P	43
0.0080932.3.6289368.0.5088935.-0.1064523.-0.0195787.-24.2185640.	39P	44
0.8668497.-0.0082834.-0.0359517.17.394318.-0.2830803.-0.2154657.	39P	45
9153069.3.8140011.0.414641.-0.1299173.-0.0150304.-23.8758721.	39P	46
430176.-0.0513715.-0.0342648.17.247828.-0.4478126.-0.1968807.	39P	47
215453.3.9578862.0.3034637.-0.1479312.-0.0103413.-23.5494709.	39P	48
0.7855659.-0.0924370.-0.0312447.17.0388789.-0.594804.-0.1710587.	39P	49
0.0290698.4.0548506.0.1803155.-0.1603252.-0.0042977.-23.2523828.	39P	50
0.6967482.-0.1298845.-0.0266683.16.7758074.-0.717561.-0.1362185.	39P	51
0.0268075.4.1010246.0.0501580.-0.1654760.-0.0013400.-22.9964619.	39P	52
0.580202.-0.1618465.-0.0222198.16.4691105.-0.8135644.-0.1040898.	39P	53
0.0556307.4.0945673.-0.0826989.-0.1670819.0.0136968.-22.7919188.	39P	54
0.4402475.-0.1884769.-0.012473.16.1310288.-0.8700941.-0.0374164.	39P	55
-0.037773.4.0357361.-0.2096393.-0.150666.-0.0166505.-22.6469164.	39P	56
0.2836828.-0.2034258.-0.0278086.15.7750432.-0.918077.-0.0825873.	39P	57
0.5315399.3.9268775.-0.3379936.-0.1706218.0.2017731;	39P	58
212.1.12.3.60.0.30.1.1.5707963.0.0.0.0.-26.00.13.50.0.0.	41P	59
12HSPLINE (112).0.0;	41P	60
118.45.51.0.0.0.0;	43P	61
102.2.47.49.0.0;	43P	62
110.2.00.18.00.3.00.5.00.18.00.3.00.0.0;	47P	63
100.3.00.6.50.18.00.5.00.18.00.8.00.18.00.0.0;	49P	64
102.2.53.55.0.0;	51P	65
110.2.00.14.00.1.00.5.00.14.00.1.00.0.0;	53P	66
100.1.00.6.50.14.00.5.00.14.00.8.00.14.00.0.0;	55P	67
212.1.19.5.70.0.30.1.1.5705963.0.0.0.0.2.00.10.50.0.0.	57P	68
19HSURF SURFACE (118).0.0;	57P	69
120.61.63.0.0.6.2831853.0.0;	59P	70
110.15.25.18.25.2.00.15.25.12.25.2.00.0.0;	61P	71
102.3.65.67.69.0.0;	63P	72
110.15.25.12.25.2.00.17.866.17.134.2.00.0.0;	65P	73
100.2.00.17.00.17.104.17.866.17.134.17.00.18.00.0.0;	67P	74
110.17.00.18.00.2.00.13.25.18.25.2.00.0.0;	69P	75
212.1.19.5.70.0.30.1.1.5705963.0.0.0.0.13.00.10.50.0.0.	71P	76
19HSURF. OF REV. (120).0.0;	71P	77

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## \*\*\* IGES DATA FILE PARSING \*\*\*

Input file is NASA

## \*\*\* Count of records per section in data file \*\*\*

Section	Records
Start	2
Global	2
Directory	346
Parameter	319
Terminate	1

Start Section from input file:

IGES TEST CASE  
THIS FILE CONTAINS AN EXAMPLE OF THE DRAWING ENTITY

Global Section from input file:

1H,,1H;,,14HIGES TEST FILE,6HNASCAD,,32,8,56,8,56,6HFILE 3,1.00,1,  
4HINCH,1,0.10,13H840716.163000,1.00E-05,100.00,9HS. GORDON,4HGSFC;

## File and Product Name Information

File name from sender = IGES TEST FILE  
Date and time of file creation = 840716.163000  
Author = S. GORDON Department = GSFC  
Product name from sender =  
Destination product name = FILE 3

## Parameter Delimiters

Delimiter = , -- Terminator = ;

## Originating System Data

System ID = NASCAD  
Translator version =  
Specification version = IGES 2.0

## Precision levels:

Integer bits =	32		
Floating point - Exponent =	8	Mantissa =	56
Double precision - Exponent =	8	Mantissa =	56

## Global Model Data

Model scale = 1.0000, Unit flag = 1, Units = INCH  
Line weights = 1, Maximum line thickness = 1.000000e-01

ORIGINAL PAGE IS  
OF POOR QUALITY



## \*\*\* IGES DATA FILE ANALYSIS \*\*\*

Input file is NASA

## Originating System Data

System ID = NASCAD

Translator version =

Specification version = IGES 2.0

## Precision levels:

Integer bits = 32

Floating point - Exponent = 8 Mantissa = 56

Double precision - Exponent = 8 Mantissa = 56

## Global Model Data

Model scale = 1.0000, Unit flag = 1, Units = INCH

Line weights = 1, Maximum line thickness = 1.000000e-01

Granularity = 1.000000e-05, Maximum coordinate = 1.000000e+02

Drafting standard applicable to original data is not specified.

## \*\* Status Flag Summary \*\*

Blank status:	Visible	172
	Blanked	1

Independence:	Independent	77
	Physically Subordinate	84
	Logically Subordinate	5
	Totally Subordinate	7

Entity use:	Geometry	52
	Annotation	120
	Definition	1
	Other	0
	Logical/Topological	0
	2D parametric	0
	Not Specified	0

Hierarchy:	Structure DE applies	173
	Subordinate DE applies	0
	Hierarchy property applies	0
	Not Specified	0

## \*\* Entity Occurrence Counts \*\*

Entity	Form	Level	Count	Type
100	0	0	8	Circular arc
102	0	0	6	Composite curve
104	1	0	1	Conic arc - ellipse
104	3	0	1	Conic arc - parabola
106	12	0	1	Copious data - Piecewise linear str
106	40	0	7	Witness line

ORIGINAL PAGE IS  
OF POOR QUALITY

RADDIM	2
TABCYL	1
SUBFIG	1
ANGDIM	2
RFRONT	1
VMTRX	4
SPLSURF	1
RTOP	1
RRIGHT	1
FRONT	1
ASSOC	2
DRAWING	1

\*\*\* Line widths used in data \*\*\*

Defaulted 173

\*\* Entity Analysis \*\*

\*\* Entity type: 100

\*\* Entity type: 102

\*\* Entity type: 104

\*\* Entity type: 106

\*\* Entity type: 108

\*\* Entity type: 110

-- 21 lines averaging 3.463159e+00 units --

\*\* Entity type: 112

\*\* Entity type: 114

\*\* Entity type: 116

\*\* Entity type: 118

\*\* Entity type: 120

\*\* Entity type: 122

ORIGINAL PAGE IS  
OF POOR QUALITY

\*\* Entity type: 410

\*\*\* End of Analysis of NASA \*\*\*

\*\* \*\* Questionable conditions encountered \*\* \*\*

W Witness line pointer is zero at D 287.  
W Witness line pointer is zero at D 287.  
W Witness line pointer is zero at D 85.

-- ++ -- 0 errors and 3 warnings encountered -- ++ --

8ENT.IGES.&BCD.1  
6-26-87 11:25:12 FUTIL 10.27

1!	1									S
2!	...	5H28ENT.46HCOMPUTERVISION CADD	4X	REV 4.1	GRAPHIC SYSTEM	,16HIGES	VERG			
3!	SION	3.0.16.8.24.8.56..1.0.1.4HINCH,32767,32.767,13H87 626.112420,								G
4!	0.000001...									G
5!	124	1	1	0	0	0	0	0		ID
6!	124	0	0	1	0					D
7!	124	2	1	0	0	0	0	0		ID
8!	124	0	0	1	0					D
9!	124	3	1	0	0	0	0	0		ID
10!	124	0	0	1	0					D
11!	124	4	1	0	0	0	0	0		ID
12!	124	0	0	1	0					D
13!	124	5	1	0	0	0	0	0		ID
14!	124	0	0	1	0					D
15!	124	6	1	0	0	0	0	0		ID
16!	124	0	0	1	0					D
17!	212	7	1	1	0	0	0	0	101010	ID
18!	212	0	0	2	0				NOTE	D
19!	308	9	1	0	0	0	0	0	202010	ID
20!	308	0	0	1	0					D
21!	124	10	1	0	0	0	0	0		ID
22!	124	0	0	1	0					D
23!	124	11	1	0	0	0	0	0		ID
24!	124	0	0	1	0					D
25!	124	12	1	0	0	0	0	0		ID
26!	124	0	0	1	0					D
27!	124	13	1	0	0	0	0	0		ID
28!	124	0	0	1	0					D

59!	108	31	1	0	0	0	0	0	10001D
	55								
60!	108	0	0	1	0				D
	56								
61!	410	32	1	0	0	0	47	0	10201D
	57								
62!	410	0	0	1	0				D
	58								
63!	406	33	1	0	0	0	0	0	10201D
	59								
64!	406	0	0	1	15				D
	60								
65!	124	34	1	0	0	0	0	0	10101D
	61								
66!	124	0	0	2	0				D
	62								
67!	108	36	1	0	0	0	0	0	10001D
	63								
68!	108	0	0	1	0				D
	64								
69!	108	37	1	0	0	0	0	0	10001D
	65								
70!	108	0	0	1	0				D
	66								
71!	108	38	1	0	0	0	0	0	10001D
	67								
72!	108	0	0	1	0				D
	68								
73!	108	39	1	0	0	0	0	0	10001D
	69								
74!	108	0	0	1	0				D
	70								
75!	410	40	1	0	0	0	61	0	10201D
	71								
76!	410	0	0	1	0				D
	72								
77!	406	41	1	0	0	0	0	0	10201D
	73								
78!	406	0	0	1	15				D
	74								
79!	124	42	1	0	0	0	0	0	10101D
	75								
80!	124	0	0	2	0				D
	76								
81!	108	44	1	0	0	0	0	0	10001D
	77								
82!	108	0	0	1	0				D
	78								
83!	108	45	1	0	0	0	0	0	10001D
	79								
84!	108	0	0	1	0				D
	80								
85!	108	46	1	0	0	0	0	0	10001D
	81								
86!	108	0	0	1	0				D
	82								
87!	108	47	1	0	0	0	0	0	10001D
	83								
88!	108	0	0	1	0				D
	84								

119!	124	63	1	0	0	0	29	0	ID
	115								
120!	124	0	0	2	0				D
	116								
121!	104	65	1	1	0	0	115	0	ID
	117								
122!	104	0	0	1	0			CONIC	D
	118								
123!	124	66	1	0	0	0	29	0	ID
	119								
124!	124	0	0	1	0				D
	120								
125!	104	67	1	1	0	0	119	0	ID
	121								
126!	104	0	0	2	0			CONIC	D
	122								
127!	110	69	1	1	0	0	0	0	ID
	123								
128!	110	0	0	1	0			LINE	D
	124								
129!	110	70	1	1	0	0	0	0	ID
	125								
130!	110	0	0	1	0			LINE	D
	126								
131!	110	71	1	1	0	0	0	0	ID
	127								
132!	110	0	0	1	0			LINE	D
	128								
133!	110	72	1	1	0	0	0	0	ID
	129								
134!	110	0	0	1	0			LINE	D
	130								
135!	110	73	1	1	0	0	0	0	ID
	131								
136!	110	0	0	1	0			LINE	D
	132								
137!	110	74	1	1	0	0	0	0	ID
	133								
138!	110	0	0	1	0			LINE	D
	134								
139!	100	75	1	1	0	0	29	0	ID
	135								
140!	100	0	0	1	0			ARC	D
	136								
141!	108	76	1	1	0	0	0	00000000	ID
	137								
142!	108	0	0	1	0			PLANE	D
	138								
143!	106	77	1	1	0	0	0	0	ID
	139								
144!	106	0	0	4	12			STRING	D
	140								
145!	126	81	1	1	0	0	0	0	2000ID
	141								
146!	126	0	0	3	0				D
	142								
147!	126	84	1	1	0	0	0	0	2000ID
	143								
148!	126	0	0	3	0				D
	144								

179!	214 175	123	1	1	0	0	0	0	10101D
180!	214 176	0	0	1	3				D
181!	214 177	129	1	1	0	0	0	0	10101D
182!	214 178	0	0	1	3				D
183!	106 179	130	1	1	0	0	0	0	10001D
184!	106 180	0	0	1	40				D
185!	106 181	131	1	1	0	0	0	0	10001D
186!	106 182	0	0	1	40				D
187!	202 183	132	1	1	0	171	29	0	101D
188!	202 184	0	0	1	0			ANGDIM	D
189!	212 185	133	1	0	0	0	0	0	10101D
190!	212 186	0	0	1	0				D
191!	214 187	134	1	1	0	0	0	0	10101D
192!	214 188	0	0	1	3				D
193!	214 189	135	1	1	0	0	0	0	10101D
194!	214 190	0	0	1	3				D
195!	202 191	136	1	1	0	171	29	0	101D
196!	202 192	0	0	1	0			ANGDIM	D
197!	212 193	137	1	0	0	0	0	0	10101D
198!	212 194	0	0	1	0				D
199!	214 195	138	1	1	0	0	0	0	10101D
200!	214 196	0	0	1	3				D
201!	222 197	139	1	1	0	171	29	0	101D
202!	222 198	0	0	1	0			RADDIM	D
203!	212 199	140	1	0	0	0	0	0	10101D
204!	212 200	0	0	1	0				D
205!	214 201	141	1	1	0	0	0	0	10101D
206!	214 202	0	0	1	3				D
207!	222 203	142	1	1	0	171	29	0	101D
208!	222 204	0	0	1	0			RADDIM	D

239!	218 235	158	1	1	0	171	29	0	1010
240!	218 236	0	0	1	0			ORDDIM	D
241!	212 237	159	1	0	0	0	0	0	101010
242!	212 238	0	0	1	0				D
243!	214 239	160	1	1	0	0	0	0	101010
244!	214 240	0	0	1	3				D
245!	214 241	161	1	1	0	0	0	0	101010
246!	214 242	0	0	2	3				D
247!	206 243	163	1	1	0	171	29	0	1010
248!	206 244	0	0	1	0			DDIM	D
249!	212 245	164	1	0	0	0	0	0	101010
250!	212 246	0	0	1	0				D
251!	214 247	165	1	1	0	0	0	0	101010
252!	214 248	0	0	1	3				D
253!	214 249	166	1	1	0	0	0	0	101010
254!	214 250	0	0	2	3				D
255!	206 251	168	1	1	0	171	29	0	1010
256!	206 252	0	0	1	0			DDIM	D
257!	212 253	169	1	0	0	0	0	0	101010
258!	212 254	0	0	1	0				D
259!	214 255	170	1	1	0	0	0	0	101010
260!	214 256	0	0	1	3				D
261!	214 257	171	1	1	0	0	0	0	101010
262!	214 258	0	0	1	3				D
263!	206 259	172	1	1	0	171	29	0	1010
264!	206 260	0	0	1	0			DDIM	D
265!	212 261	173	1	0	0	0	0	0	101010
266!	212 262	0	0	1	0				D
267!	214 263	174	1	1	0	0	0	0	101010
268!	214 264	0	0	1	3				D



299!	402	190	1	0	0	0	0	0	20201D
	295								
300!	402	0	0	1	3				D
	296								
301!	212	191	1	1	0	295	29	0	101D
	297								
302!	212	0	0	2	0			NOTE	D
	298								
303!	212	193	1	1	0	295	29	0	101D
	299								
304!	212	0	0	2	0			NOTE	D
	300								
305!	212	195	1	1	0	295	29	0	101D
	301								
306!	212	0	0	2	0			NOTE	D
	302								
307!	212	197	1	1	0	295	29	0	101D
	303								
308!	212	0	0	2	0			NOTE	D
	304								
309!	212	199	1	1	0	295	29	0	101D
	305								
310!	212	0	0	2	0			NOTE	D
	306								
311!	212	201	1	1	0	295	29	0	101D
	307								
312!	212	0	0	2	0			NOTE	D
	308								
313!	212	203	1	1	0	295	29	0	101D
	309								
314!	212	0	0	2	0			NOTE	D
	310								
315!	212	205	1	0	0	0	0	0	10101D
	311								
316!	212	0	0	1	0				D
	312								
317!	214	206	1	0	0	0	0	0	10101D
	313								
318!	214	0	0	1	3				D
	314								
319!	214	207	1	0	0	0	0	0	10101D
	315								
320!	214	0	0	1	3				D
	316								
321!	106	208	1	0	0	0	0	0	10101D
	317								
322!	106	0	0	2	11				D
	318								
323!	228	210	1	1	0	295	29	0	101D
	319								
324!	228	0	0	1	0			FLAG	D
	320								
325!	212	211	1	0	0	0	0	0	10101D
	321								
326!	212	0	0	1	0				D
	322								
327!	214	212	1	0	0	0	0	0	10101D

359!	210	231	1	1	0	295	29	0	101D
	355								
360!	210	0	0	1	0			LABEL	D
	356								
361!	212	232	1	1	0	295	29	0	101D
	357								
362!	212	0	0	2	0			NOTE	D
	358								
363!	212	234	1	1	0	295	29	0	101D
	359								
364!	212	0	0	2	0			NOTE	D
	360								
365!	212	236	1	1	0	295	29	0	101D
	361								
366!	212	0	0	2	0			NOTE	D
	362								
367!	212	238	1	1	0	295	29	0	101D
	363								
368!	212	0	0	2	0			NOTE	D
	364								
369!	212	240	1	1	0	295	29	0	101D
	365								
370!	212	0	0	2	0			NOTE	D
	366								
371!	212	242	1	1	0	295	29	0	101D
	367								
372!	212	0	0	2	0			NOTE	D
	368								
373!	212	244	1	1	0	295	29	0	101D
	369								
374!	212	0	0	4	0			NOTE	D
	370								
375!	212	248	1	1	0	295	29	0	101D
	371								
376!	212	0	0	2	0			NOTE	D
	372								
377!	212	250	1	1	0	295	29	0	101D
	373								
378!	212	0	0	2	0			NOTE	D
	374								
379!	212	252	1	1	0	295	29	0	101D
	375								
380!	212	0	0	2	0			NOTE	D
	376								
381!	212	254	1	1	0	295	29	0	101D
	377								
382!	212	0	0	2	0			NOTE	D
	378								
383!	212	256	1	1	0	295	29	0	101D
	379								
384!	212	0	0	1	0			NOTE	D
	380								
385!	212	257	1	1	0	295	29	0	101D
	381								
386!	212	0	0	2	0			NOTE	D
	382								
387!	212	259	1	1	0	295	29	0	101D
	383								
388!	212	0	0	2	0			NOTE	D
	384								

419!	406	277	1	0	0	0	0	0	10201D
	415								
420!	406	0	0	1	5558				D
	416								
421!	120	278	1	1	0	0	0	0	1D
	417								
422!	120	0	0	1	0			SURFRE	D
	418								
423!	110	279	1	0	0	0	0	0	10001D
	419								
424!	110	0	0	1	0				D
	420								
425!	110	280	1	0	0	0	0	0	20001D
	421								
426!	110	0	0	1	0				D
	422								
427!	406	281	1	0	0	0	0	0	10201D
	423								
428!	406	0	0	1	5558				D
	424								
429!	120	282	1	1	0	0	0	0	1D
	425								
430!	120	0	0	1	0			SURFRE	D
	426								
431!	110	283	1	0	0	0	0	0	20001D
	427								
432!	110	0	0	1	0				D
	428								
433!	110	284	1	0	0	0	0	0	20001D
	429								
434!	110	0	0	1	0				D
	430								
435!	406	285	1	0	0	0	0	0	10201D
	431								
436!	406	0	0	1	5558				D
	432								
437!	118	286	1	1	0	0	0	0	1D
	433								
438!	118	0	0	1	0			RSURF	D
	434								
439!	100	287	1	0	0	0	29	0	20001D
	435								
440!	100	0	0	1	0				D
	436								
441!	100	288	1	0	0	0	29	0	20001D
	437								
442!	100	0	0	1	0				D
	438								
443!	406	289	1	0	0	0	0	0	10201D
	439								
444!	406	0	0	1	5558				D
	440								
445!	118	290	1	1	0	0	0	0	1D
	441								
446!	118	0	0	1	0			RSURF	D
	442								
447!	128	291	1	1	0	0	0	0	1D
	443								

479!124,1,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,1,0,0,0;	33P
19	
480!108,1,0,0,0,0,0,-122.0;	35P
20	
481!108,0,0,1,0,0,0,-94.0;	37P
21	
482!108,1,0,0,0,0,0,-88.0;	39P
22	
483!108,0,0,1,0,0,0,-116.0;	41P
23	
484!410,5,1,0,35,37,39,41,0,0,3,385,295,171,1,31;	43P
24	
485!406,1,2HV3;	45P
25	
486!124,0,5,-0.433013,-0.75,0,0,0.433013,0.875,-0.216506,0,0,0.75,	47P
26	
487!-0.216506,0.625,0,0;	47P
27	
488!108,0,5,-0.433013,-0.75,-122.0;	49P
28	
489!108,0.433013,0.875,-0.216506,-24.0;	51P
29	
490!108,0,5,-0.433013,-0.75,-88.0;	53P
30	
491!108,0.433013,0.875,-0.216506,-46.0;	55P
31	
492!410,4,1,0,49,51,53,55,0,0,0,1,45;	57P
32	
493!406,1,2HV2;	59P
33	
494!124,0,75,-0.216506,0.625,0,0,-0.5,0.433013,0.75,0,0,-0.433013,	61P
34	
495!-0.875,0.216506,0,0;	61P
35	
496!108,0,75,-0.216506,0.625,-52.0;	63P
36	
497!108,-0,5,0.433013,0.75,-94.0;	65P
37	
498!108,0,75,-0.216506,0.625,-18.0;	67P
38	
499!108,-0,5,0.433013,0.75,-116.0;	69P
39	
500!410,3,1,0,63,65,67,69,0,0,0,1,59;	71P
40	
501!406,1,2HV1;	73P
41	
502!124,0,75,-0.216506,0.625,0,0,0.433013,0.875,-0.216506,0,0,-0.5,	75P
42	
503!0.433013,0.75,0,0;	75P
43	
504!108,0,75,-0.216506,0.625,-52.0;	77P
44	
505!108,0.433013,0.875,-0.216506,-24.0;	79P
45	
506!108,0,75,-0.216506,0.625,-18.0;	81P
46	
507!108,0.433013,0.875,-0.216506,-46.0;	83P
47	
508!410,2,1,0,77,79,81,83,0,0,3,385,295,171,1,73;	85P
48	

539!	22.0355,0.43333,15.5637,21.0289,1.56814,13.8508,20.3676,1.4746,	139P
540!	12.5539,21.5864,0.573045,12.157,22.5453,0.421491;	139P
541!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	141P
542!	-13.4629,20.6219,-18.3268,-13.4504,20.7095,-18.3064,-13.4379,	141P
543!	20.797,-18.2861,-13.423,20.8822,-18.2589,0,0,1,0,1,445;	141P
544!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	143P
545!	-13.423,20.8822,-18.2589,-13.4011,21.0073,-18.219,-13.3742,	143P
546!	21.1272,-13.1645,-13.3441,21.2402,-18.1001,0,0,1,0,1,445;	143P
547!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	145P
548!	-13.3441,21.2402,-18.1001,-13.3236,21.317,-18.0563,-13.3016,	145P
549!	21.3905,-13.0079,-13.2781,21.4603,-17.9548,0,0,1,0,1,445;	145P
550!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	147P
551!	-13.2781,21.4603,-17.9549,-13.2436,21.5627,-17.8769,-13.2059,	147P
552!	21.6567,-17.7899,-13.1659,21.7402,-17.6928,0,0,1,0,1,445;	147P
553!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	149P
554!	-13.1659,21.7402,-17.6928,-13.1258,21.8238,-17.5968,-13.0834,	149P
555!	21.8969,-17.4926,-13.0396,21.958,-17.3827,0,0,1,0,1,445;	149P
556!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	151P
557!	-13.0396,21.958,-17.3827,-13.0097,21.9997,-17.3078,-12.9792,	151P
558!	22.0358,-17.2302,-12.9482,22.0662,-17.1505,0,0,1,0,1,445;	151P
559!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	153P
560!	-12.9432,22.0662,-17.1505,-12.9027,22.1107,-17.0334,-12.8562,	153P
561!	22.1428,-16.9117,-12.8098,22.1615,-16.7881,0,0,1,0,1,445;	153P
562!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	155P
563!	-12.8098,22.1615,-16.7881,-12.7634,22.1803,-16.6644,-12.717,	155P
564!	22.1859,-16.5388,-12.6716,22.1781,-16.4136,0,0,1,0,1,445;	155P
565!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	157P
566!	-12.6716,22.1781,-16.4136,-12.6261,22.1702,-16.2885,-12.5816,	157P
567!	22.1491,-16.1638,-12.539,22.115,-16.0421,0,0,1,0,1,445;	157P
568!	126,3,3,0,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,	159P

599!222,193,195,-2.0,-4.0; 139	197P
600!212,1,5,1.0,0.2,1,1.5708,0.0,0,0,-6.3,-2.6,0.0,5H1.000; 140	199P
601!214,3,0.2,0.025,0.0,-8.4,-1.8,-9.0,-1.0,-7.9,-2.5,-7.0,-2.5; 141	201P
602!222,199,201,-9.0,-1.0; 142	203P
603!212,1,7,1.4,0.2,1,1.5708,0.0,0,0,-17.9,-8.0,0.0,7HP0INT 2; 143	205P
604!214,3,0.0,0.0,0.0,0.0,-16.4,-8.1,-18.1,-8.1,-19.3,-5.9,-19.3,-5.3; 144	207P
605!220,205,207,0; 145	209P
606!212,1,7,1.4,0.2,1,1.5708,0.0,0,0,-13.4,-2.4,0.0,7HP0INT 1; 146	211P
607!100,0.0,-12.8,-2.3,-11.5,-2.3,-11.5,-2.3; 147	213P
608!214,3,0.0,0.0,0.0,0.0,-12.7,-3.6,-12.7,-4.1,-14.6,-6.7,-14.6,-7.4; 148	215P
609!220,211,215,213; 149	217P
610!212,1,4,0.8,0.2,1,1.5708,1.57963,0,0,-21.9,-6.5,0.0,4H2.52; 150	219P
611!214,1,0.2,0.025,0.0,-22.0,-3.0,-22.0,-5.5; 151	221P
612!218,219,221; 152	223P
613!212,1,4,0.8,0.2,1,1.5708,0.0,0,0,-24.3,-4.1,0.0,4H4.00; 153	225P
614!214,1,0.0,0.0,0.0,0.0,-28.5,-4.0,-24.5,-4.0; 154	227P
615!218,225,227; 155	229P
616!212,1,4,0.8,0.2,1,1.5708,0.0,0,0,-24.3,-2.1,0.0,4H4.00; 156	231P
617!214,1,0.2,0.025,0.0,-28.5,-2.0,-24.5,-2.0; 157	233P
618!218,231,233; 158	235P
619!212,1,5,1.0,0.2,1,1.5708,0.0,0,0,-12.0,3.0,0.0,5H4.000; 159	237P
620!214,2,0.2,0.025,0.0,-12.43,4.55,-11.57,8.45,-11.57,8.45; 160	239P
621!214,3,0.2,0.025,0.0,-11.57,8.45,-12.75,3.13,-12.75,3.13,-12.25, 161	241P
622!3.13; 162	241P
623!206,237,239,241,-12.0,6.5; 163	243P
624!212,1,5,1.0,0.2,1,1.5708,0.0,0,0,-15.0,7.5,0.0,5H4.000; 164	245P
625!214,2,0.2,0.025,0.0,-15.84,6.49,-16.16,2.57,-16.16,2.57; 165	247P
626!214,3,0.2,0.025,0.0,-16.16,2.57,-15.75,7.63,-15.75,7.63,-15.25, 166	249P
627!7.63; 167	249P
628!206,245,247,249,-16.0,4.53; 168	251P

659!212,1,21,6.3072,0.3,1,1.5708,0.0,0.0,-18.0,-9.5,0.0,21HPPOINT DIM	305P
199	
660!ENSION (220);	305P
200	
661!212,1,24,7.1961,0.3,1,1.5703,0.0,0.0,-28.0,-9.5,0.0,24HORDINATE	307P
201	
662!DIMENSION (218);	307P
202	
663!212,1,15,4.5059,0.3,1,1.5708,0.0,0.0,-8.0,0.5,0.0,15HFLAG NOTE (	309P
203	
664!208);	309P
204	
665!212,1,10,2.0,0.2,1,1.5708,0.0,0.0,-4.5,3.5,0.0,10HFLAG NO. 3;	311P
205	
666!214,2,0.2,0.025,0.0,-8.5,3.0,-6.0,3.6,-4.54,3.6;	313P
206	
667!214,1,0.2,0.025,0.0,-8.5,4.5,-6.0,3.6;	315P
207	
668!106,1,6,0.0,-4.54,3.4,-4.54,3.8,-2.46,3.8,-2.17436,3.6,-2.46,	317P
208	
669!3.4,-4.54,3.4;	317P
209	
670!228,311,1,317,2,313,315;	319P
210	
671!212,1,10,2.0,0.2,1,1.5708,0.0,0.0,-4.5,6.5,0.0,10HFLAG NO. 2;	321P
211	
672!214,2,0.2,0.025,0.0,-9.3,5.5,-5.1,6.6,-4.54,6.6;	323P
212	
673!106,1,6,0.0,-4.54,6.4,-4.54,6.8,-2.46,6.8,-2.17436,6.6,-2.46,	325P
213	
674!6.4,-4.54,6.4;	325P
214	
675!228,321,1,325,1,323;	327P
215	
676!212,1,10,2.0,0.2,1,1.5708,0.0,0.0,-4.5,8.5,0.0,10HFLAG NO. 1;	329P
216	
677!106,1,6,0.0,-4.54,8.4,-4.54,8.8,-2.46,8.8,-2.17436,8.6,-2.46,	331P
217	
678!8.4,-4.54,8.4;	331P
218	
679!228,329,1,331,0;	333P
219	
680!212,1,19,5.6914,0.3,1,1.5708,0.0,0.0,2.0,0.5,0.0,19HGENERAL LABE	335P
220	
681!L (210);	335P
221	
682!212,1,7,1.4,0.2,1,1.5708,0.0,0.0,1.4,3.39,0.0,7HLABEL 3;	337P
222	
683!214,1,0.2,0.025,0.0,7.5,3.5,3.0,3.5;	339P
223	
684!214,1,0.2,0.025,0.0,7.0,5.0,3.5,3.5;	341P
224	
685!210,337,2,339,341;	343P
225	
686!212,1,7,1.4,0.2,1,1.5708,0.0,0.0,4.5,6.3,0.0,7HLABEL 2;	345P
226	
687!214,2,0.2,0.025,0.0,8.5,8.5,7.1,6.4,6.1,6.4;	347P
227	
688!210,345,1,347;	349P
228	

- 719!212,1,18,5.402,0.3,1,1.5708,0.0,0.0,-28.0,20.48,0.0,18HCIRCULAR	383P
259	
- 720!ARC (100);	383P
260	
- 721!402,2,0,43,85;	385P
261	
- 722!124,0,75,0.433013,-0.5,1.5,-0.216506,0.875,0.433013,-4.5,0.625,	387P
262	
723!-0.216506,0.75,-0.65;	387P
263	
- 724!408,15,0.0,0.0,0.0,1.0;	389P
264	
725!100,0,0,26.5,12.5,27.5,12.5,26.5,13.5;	391P
265	
- 726!406,3,5,5,0;	393P
266	
- 727!122,391,25.5,17.0,-2.67,0,1,393;	395P
267	
728!110,25.7207,6.07508,13.6397,21.9707,7.15761,10.5147;	397P
268	
- 729!406,3,5,5,0;	399P
269	
730!122,397,25.183,18.0915,-3.51151,0,1,399;	401P
270	
- 731!110,18.34,13.5331,7.08001,15.7419,8.28305,8.37905;	403P
271	
- 732!110,15.7419,8.28305,8.37905,19.8187,11.9902,8.95663;	405P
272	
733!406,3,5,5,0;	407P
273	
- 734!120,403,405,0.0,6.28319,0,1,407;	409P
274	
735!110,18.34,13.5331,7.08001,15.7419,8.28305,8.37905;	411P
275	
- 736!100,2,0,17.0,17.134,17.866,17.134,17.0,18.0;	413P
276	
- 737!406,3,5,5,0;	415P
277	
738!120,411,413,0.0,6.28319,0,1,415;	417P
278	
- 739!110,18.34,13.5331,7.08001,15.7419,8.28305,8.37905;	419P
279	
- 740!110,19.5442,12.9354,8.22789,18.34,13.5331,7.08001;	421P
280	
- 741!406,3,5,5,0;	423P
281	
- 742!120,419,421,0.0,6.28319,0,1,423;	425P
282	
743!110,7.79423,16.616,-0.397115,10.0442,15.9665,1.47788;	427P
283	
- 744!110,7.06218,12.25,-1.03109,9.31218,11.6005,0.84391;	429P
284	
745!406,3,5,5,0;	431P
285	
- 746!118,427,429,0,0,0,1,431;	433P
286	
- 747!100,3,0,6.5,18.0,5.0,18.0,8.0,18.0;	435P
287	
- 748!100,1,0,6.5,14.0,5.0,14.0,8.0,14.0;	437P
288	